2018

District Transportation Asset Management Plans

Kevin L. Gantt

SCDOT

3/30/2018

INTRODUCTION

In June of 2017, the South Carolina General Assembly passed a historic Roads Bill (Act 40). For the first time in 30 years, lawmakers increased the state's gas tax by 12 cents per gallon to improve the condition of South Carolina's Transportation system. Maintaining the 4th largest transportation system in the country with over 41 thousand miles of road, SCDOT has faced increasing difficulty in meeting the demands of a growing population and needs of a thriving economy.

In order to clearly communicate the state's transportation infrastructure needs to the State's lawmakers, SCDOT's Secretary of Transportation reached for a new tool. It was the Agency's Transportation Asset Management Plan or TAMP. The plan summarizes the condition of the agency's physical assets (roads and bridges) and corresponding funding levels to project conditions over a ten year period. By illustrating different applications of funding increases, SCDOT was able to present a menu of options for consideration by the General Assembly. The presentation of this information was a game changer, as Senators and Representatives actively engaged in debating different funding scenarios to improve South Carolina's Transportation infrastructure. In 2016, Act 275 was passed awarding over $400 million in non-recurring funding to the agency. The following year, the state's gas tax was increased by 12 cents because of SCDOT's clear description of its needs and corresponding costs.

PROBLEM STATEMENT

Now that the funding increase has been secured, SCDOT is challenged to deliver the improvements to the state's transportation system and to the citizens of the state. The agency's TAMP was developed to provide an overview of the condition of our assets and project the expected conditions over a ten year period with respect to the recent funding increases. A more detailed look into SCDOT's business practices, programming and funding allocation is required to deliver results. Annual reviews of progress toward the goals will be necessary to track the agency's performance toward its ten year performance targets. South Carolina is comprised of 46 counties. SCDOT manages those counties by grouping them into 7 Engineering Districts. Each District has a different mix of priority networks, population, commercial and farming needs that connect their counties to the rest of the state and the country.

DATA COLLECTION

In order to support the need for this project, it is necessary to provide additional background information. As stated in the introduction, the South Carolina Department of Transportation was the beneficiary of increased funding from the South Carolina General Assembly with the expectation of a much improved transportation system. Upon receiving this funding, the agency immediately began its work to develop a ten year plan to project the results of the funding increase. The condition projections are outlined, in **Figure 1,** with historical system conditions dating back to 2008.

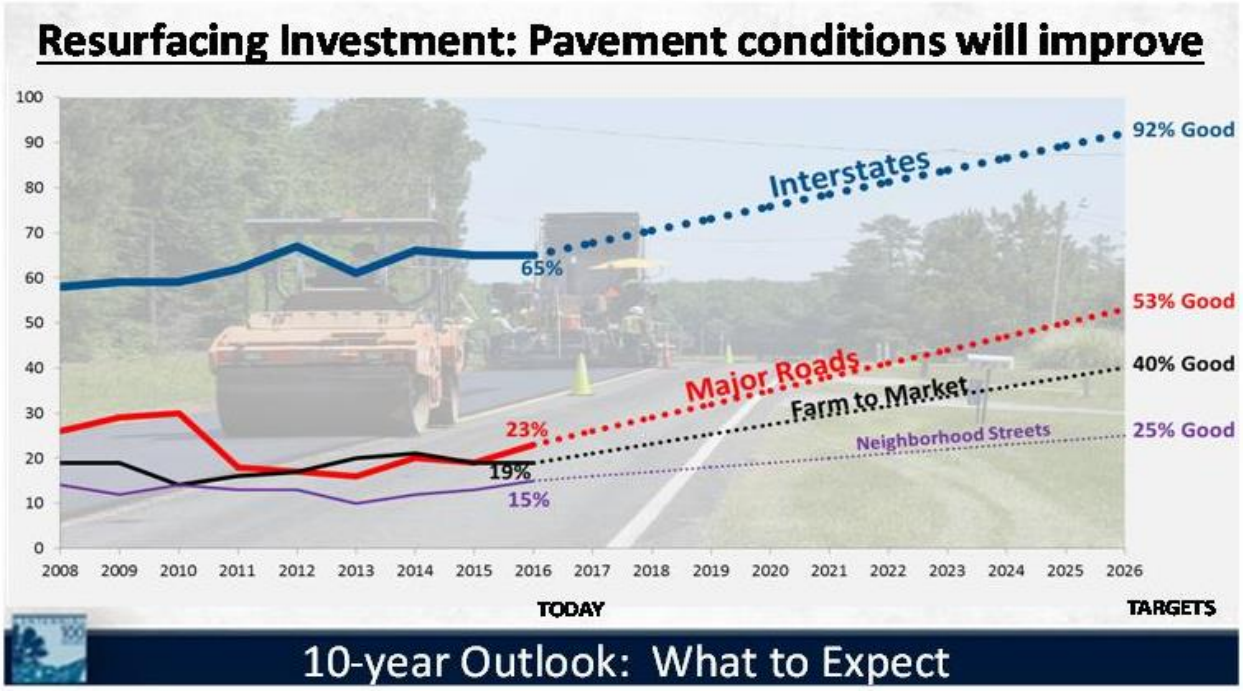

FIGURE 1

The focus of this project will be the Major Roads (**Primary**), **Farm to Market** (Federal Aid Secondary) and Neighborhood Streets (**Non Federal Aid Secondary**). In terms of centerline miles, these systems make up 98% of the South Carolina's highway system and carry 70% of the annual traffic in the state. These roads carry the citizens of our state from home to work and school while supporting the quality of life and economic vitality. With additional funding, the percent of "good" roads in these 3 systems is expected to double over the next ten years.

Figure 2 is a high level illustration of "The Plan" developed by the Secretary of Transportation (SOT) and SCDOT's Executive Staff to illustrate ***how*** the additional funding will be strategically applied to the agency's budget to produce the results viewed in **Figure 1**. By proactively developing and communicating this plan to its

stakeholders, the agency strengthened its accountability and transparency. As illustrated in **Figure 2**, the agency will receive an estimated increase of $800 million annually. Of that funding, just over half will be used to improve the conditions of our pavements.

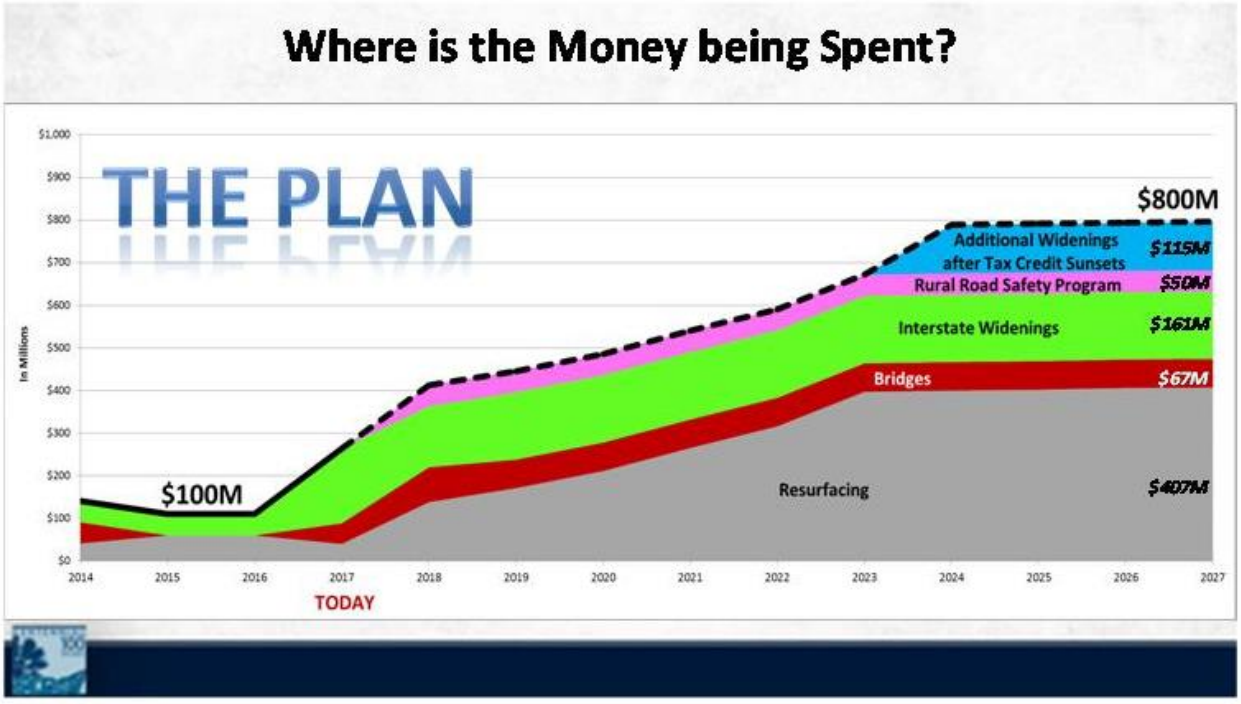

FIGURE 2

Now, that the funds have been secured and the plan has been established, what is the next step? Just how will the agency be able to deliver these lofty ten year performance goals? The TAMP is still a relatively new tool to SCDOT's management. The document, to this point, has been used to communicate present and future conditions at different funding levels. In order to deliver the plan, a much more detailed application of the TAMP will be required. The principles of the TAMP should be

applied in each of SCDOT's seven Engineering Districts and incorporated into their business practices. This is where preservation and rehabilitation projects are selected and developed to let for construction. Developing Districts Plans will give local stakeholders (county and regional) a much clearer view of SCDOT's short and long term programming goals. District TAMP's will also promote funding collaboration and programming efficiency.

To support the need for the District TAMP's, let's discuss SCDOT's recent updates to the Pavement Improvement and Preservation Program (PIPP). This program is managed at a state level by the Director of Maintenance Office (DOM). Funds are distributed to each of the state's 46 counties based on a formula that considers pavement condition, average daily traffic and population. The funds are then divided into different roadway categories. As a result of the TAMP, all pavements with the exception of the interstate program are managed in the SCDOT's PIPP. The Engineering Districts are then charged to select roads for contracts from ranked list based on Pavement Quality Index (PQI) and locally determined factors.

The primary data collected for this project rests with the information depicted in **Figure 3**. The information in each district was pulled from SCDOT's Performance Viewer and compared to the state the statewide average. This system is not complete and available for agency use. The Performance Viewer was developed as a resource to report the condition of the South Carolina's transportation assets at state, regional and county levels. **Figure 3** shows the condition of the Major Roads (Primary road system)

in terms of percent good, fair and poor to compare variations to statewide conditions. At first glance the variations may not seem very significant. However, Districts that begin this process more than 7% below the statewide average of percent good may be challenged to deliver improvements that meet public's expectations. On the other hand, districts that begin the ten year performance period at or above the average may have more flexibility in their programming.

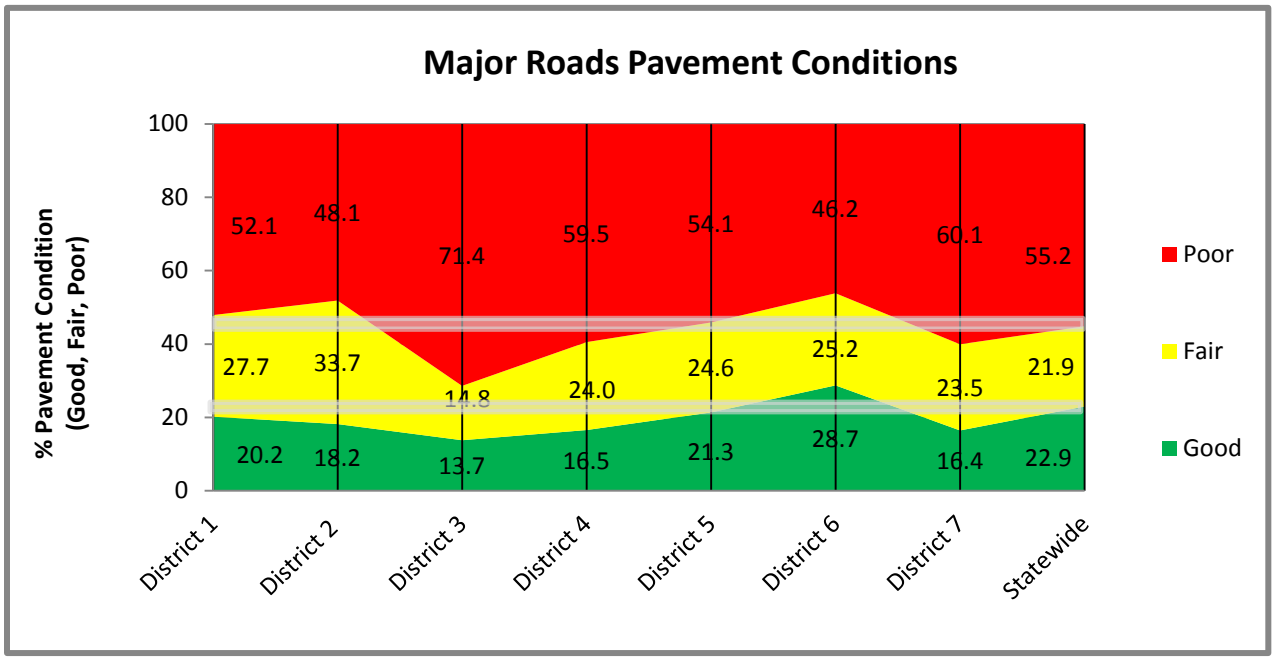

FIGURE 3

ANALYSIS

In order to analyze this data, a basic understanding of the programming options is necessary. There are 3 types of projects used to repair pavements; preservation, rehabilitation and reconstruction. To extend the life of good pavements, preservation methods are used. These are the least expensive of projects. For pavements in fair

condition, rehabilitation projects are employed. And finally, for pavements that have failed and are in the poorest condition, reconstruction is required. Because this is the most expensive method of construction, it is preferable to extend the life of the agency's roads before they reach this state.

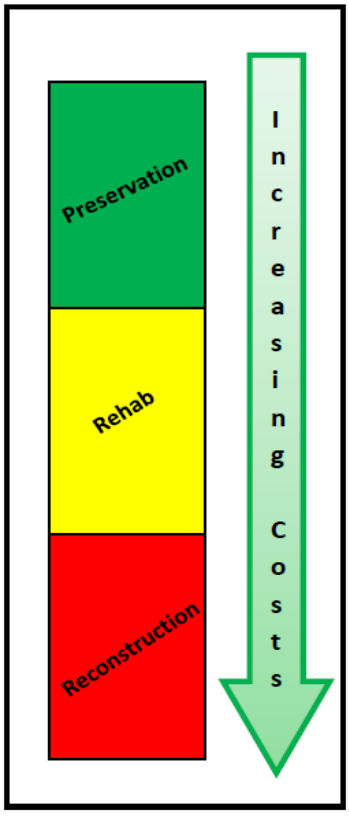

Figure 4

Understanding this relationship provides insight into the variations of the data collected for each district. For example, one of the most noticeable sets is Engineering District 3. This area shows the lowest percent good and the highest percentage of roads in poor condition on the state's primary system. Inversely, District 6 exhibits exactly the opposite data with the highest percent good and lowest percentage of roads in poor condition. Considering only the conditions in these 2 districts and the most efficient programming of projects by area, it would not be practical to program projects in these areas using guidance developed at the agency level. It would be more effective to develop and program projects that targeted the specific challenges of each engineering district.

Furthermore, a closer look at funding may also be required. Even though the Pavement Improvement and Preservation Program distributes money to districts and counties by formula, it may be necessary to holdback a portion of the funds to redistribute to areas that have significantly lower system conditions or to connect

priority networks or corridors with state significance. These funds could be used at the discretion of the SOT and the Executive Staff, with approval of the Commission to provide balanced improvements to the state's roads. A hold back for Districts is also recommended as it would allow local flexibility and input to encourage the construction of corridors verses smaller projects that are not connected.

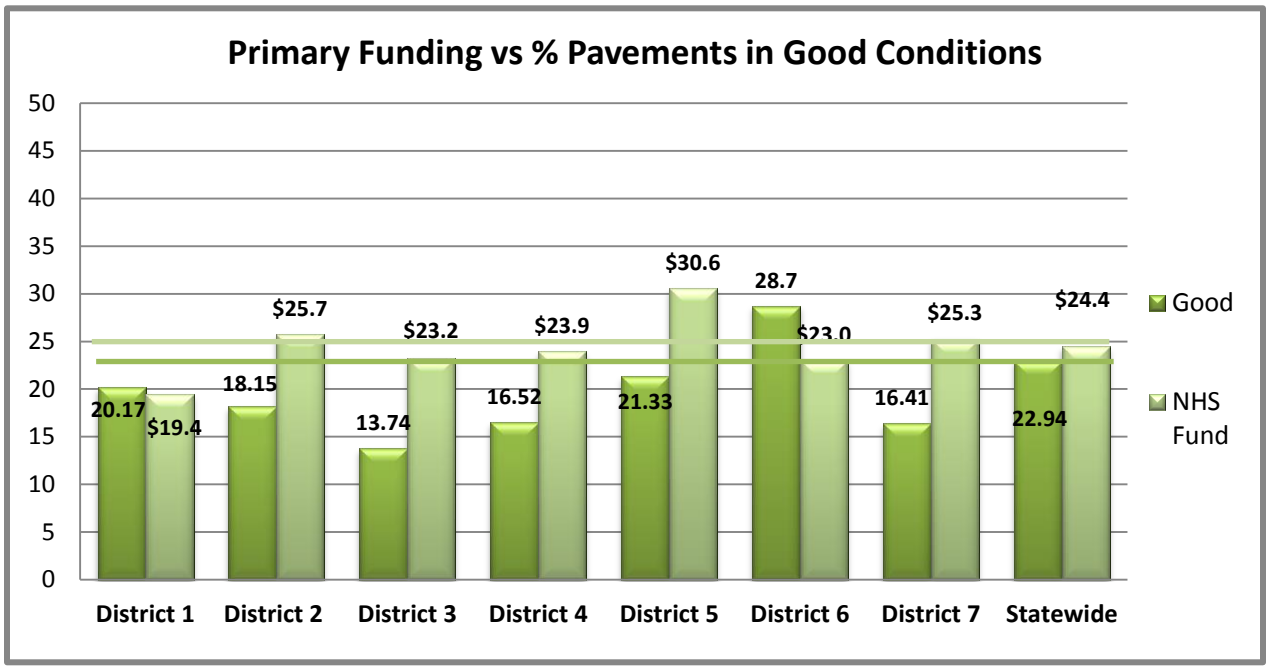

FIGURE 5

Figure 5 shows the 2018 funding for the primary system (in millions) vs the percent good for each Engineering District. While most Districts are below the statewide average in condition, the funding distribution is not consistent. Districts 2, 3, 4 and 7 have the lowest percent good with fairly consistent funding amounts. But District 1 and 5 contradict the logical allocation of funds. District 1 is slightly below the statewide average condition but received 5 million less than the average statewide

funding. District 5, with a similar % good, received 6 million more than the state average to improve its pavements. Managing different regions of the state with consideration to population, and road condition may not provide consistent improvement across the state.

IMPLEMENTATION

SCDOT has already adopted the TAMP at an agency level and moved to performance based programming of projects. This would make implementation of District TAMP's a much more efficient process. Developing seven District specific plans is actually the next logical step for the agency as it takes purposeful steps to deliver the plan's ten year performance goals. With buy-in from the SOT and the Executive Staff, this project could be implemented within one calendar year. Currently, each Engineering District has assigned staff for developing pavement contracts. The District Contracts Engineer would be responsible for developing the plan but the effort would championed by the District Engineering Administrator. This would encourage buy-in from the staff across the counties and ensure its success. Each District would then compile and present its update to the Executive Staff for discuss and review and then it could be used as a programming guide for the remainder of the year.

District TAMP's could be implemented quickly at minimal costs. The majority of the information is currently available to most of the agencies employees. SCDOT's Integrated Transportation Management System (ITMS), P2S, Project Viewer and Performance Viewer, which is currently under development, would all provide useful

information to staff to aid in developing District TAMP's. These systems give data on scheduled and actual projects, funding and pavement conditions. Information collected from these resources allows staff insight into the specific needs of their area's transportation system.

Additional resources that could be used for successful implementation of the District TAMP's are divisions that work with programs that manage funds used to improve the state's pavements. The Director of Maintenance Office develops the statewide PIPP and would be considered a primary resource. The Office of Planning oversees the Statewide Transportation Improvement Program (STIP) and could offer insight. SCDOT has recently developed an additional safety program that focused on rural road safety. Identifying safety funds for projects could be an efficient method of programming. Enhancements and Special Programs would also be a key resource. This office works directly with all 46 County Transportation Committees and would be helpful in identifying local funds to assist Contract Managers in counties across their district. Since 25% of their funding must be spent on the state roads, most CTC's are eager to partner with SCDOT on projects in their area.

There are, of course, some obstacles in implementing District TAMP's. The first hurdle is training. It is highly recommended that all District Contract staff should receive a standardized training in the use of all the available resources needed to develop these plans. A planning template of the plan should be completed in advance of the training to ensure that the plans are developed consistently in each district.

SCDOT will be the recipient of nearly $800 million annually as a result of the Act 40 but no additional staffing was given to SCDOT to deliver the improved transportation system. This will initially present a hardship to staff during the implementation of the District TAMP's. However, the individual plans will promote efficiency and a much deeper understanding of the agency's programming.

Ultimately, District TAMP's will breakdown silos between many of the divisions of the agency and become the cornerstone of a living document. By sharing programming goals and creating opportunities to fund projects from different divisions of the agency, the programming process should be streamlined. With increasing funding over the next 5 years, it will be important to let projects that meet the transportation needs of the communities and regions they serve. This means that projects should be planned with respect to each other and let in the most efficient way possible. Simply put, SCDOT will need to improve communication internally and externally with its stakeholders. Setting common goals and working together to accomplish them is the quickest path to achieving SCDOT's ten year performance goals. Updating the TAMP would then become an exercise of summarizing annual progress, presenting two year list of anticipated projects, and identifying critical or unmet needs of the Engineering Districts. Each district would meet with the SOT and the Executive Staff once a year to present their plan. The TAMP, at an agency level, would then be adjusted to keep the agency on track to deliver its goals.

District Contracts Engineers would return to their areas with a prioritized list of projects. Politicians and local leaders would have clear view of the projects planned for their area and would be encouraged to provide input by sharing unmet or future transportation needs. Local planning bodies would be given the opportunity to partner with SCDOT or plan to sponsor other improvements without the risk of planning projects that are in conflict. District TAMP's would create a level of transparency for the agency never experienced before by SCDOT.

EVALUTION

In the course of researching this topic and developing the framework for District Transportation Asset Management Plans, many key components were already in place. The Director of Maintenance Office has created a more comprehensive approach to managing the Pavement and Preservation and Improvement Plan. This pavement funding is broken down into asset groups to target and track condition. The Deputy Director of Intermodal Planning has also placed more emphasis on tracking the data essential to the agency's successful delivery of its ten year goals. By increasing the testing frequency of pavements and creating the Pavement Viewer to track the condition of the SCDOT's pavements, contract managers will be equipped with much needed improvements in the tools available to achieve the objectives of the plan.

When the data compiled for the TAMP was broken down into districts, some interesting differences were brought to light. At an agency level, the current condition of individual systems clearly illustrated the decline of South Carolina's transportation

infrastructure. However, closer analysis revealed variability in system conditions and corresponding funding across the seven engineering districts. In order to produce consistent results across specific asset groups; it may be necessary to introduce new criteria to consider in funding distribution. Notably, snow and ice events accelerate the deterioration of pavement conditions. Also, consistently high volumes of traffic dramatically decrease the condition of the pavements. Moving forward, it is recommended that SCDOT improve its funding distribution formula to better fit its needs based approach to improve pavements. This may require monitoring similar corridors in counties across the state to document the effects of these variables (frozen precipitation and high traffic volumes).

The challenge of delivering the ten year plan with no increases in the workforce should not be underestimated. SCDOT will be challenged to streamline its business practices to increase the productivity of its staff. Repurposing employees should be considered along with the reorganization of certain divisions to align with the strategic goals of the agency and deliver its goals. As a large government agency, SCDOT may be forced to consider analyzing and improving its business model to advance the agency's mission without increasing manpower.

SUMMARY

District Transportation Asset Management Plans will provide an excellent opportunity to encourage buy-in from the Districts. Incorporating this bottom up management style will unify SCDOT's employees and focus the agency's efforts toward

a singular mission. Reaching out to stakeholders and creating a new level of candid communication will serve a dual benefit. The initial benefit is partnership with local and regional stakeholders to earn public trust by developing projects together. The second gain is increased accountability in the eyes lawmakers and taxpayers by delivering projects that meet the needs of citizens and the communities of the state. With District level management of the Transportation Asset Management Plans, projects can be planned and executed more efficiently.

With such a low cost and effort to implement, District TAMP's could assist SCDOT in meeting its ten year performance goals. The agency has already made huge strides to first communicate its needs and secure a historic funding increase with the passing of Act 40 in 2017. With recent improvements in the Pavement Improvement and Preservation Plan, P2S, ITMS and the new Pavement Viewer, SCDOT has taken positive steps to make its goals attainable. In conjunction with these successes, the following steps are recommended:

- Set district performance targets for each pavement category
- Review annual progress of each district with Executive Staff
    - Verify progress toward targets
    - Reallocate funding to other areas if some targets are met
- Review funding distribution formulas to ensure that they are need based
- Empower District Contracts Engineer and staff to work with stakeholders to develop projects for municipalities, counties and planning offices. This

will promote transparency, allow the opportunity to pool funds and increase efficiency while programming a growing project load.

Thorough analysis of data broken down by districts clearly illustrates that each district has a different set of hurdles in delivering the goals of the agency's ten year plan. Not incorporating District TAMP's would be a missed opportunity for SCDOT. The TAMP is a living document, but it does not live in the halls of a headquarters building or a binder on the desk of an agency manager. Instead it should exist in every corner of the agency.

DEFINITIONS

COG - Council of Governments. Rural planning bodies recognized composed of county government officials to provide local guidance on project selection.

CTC – County Transportation Committee. Located in every county in the state, these committees are funded through SCDOT and are required to spend a percentage of their annual funding on state owned roads.

DEA - District Engineering Administrator

District TAMP - District Transportation Asset Management Plan. TAMP's developed by engineering districts to enable SCDOT to better serve local transportation needs and deliver it ten year goals.

DOM - Director of Maintenance

Federal Aid (FA) – federally funded

MPO – Metropolitan Planning Organization. Urban planning bodies composed of local government officials to provide guidance on project selection.

National Highway System (NHS) – a network of federally funded roads of national significance. Includes Interstates, US and SC routes.

Primary System (major roads) - high volume roads, usually US or SC routes, that carry a major portion of the traffic in the state.

Priority Networks – important transportation networks that serve specific purposes to the state of South Carolina. Strategic, Freight or Evacuation routes

Pavement Quality Index – SCDOT's internal metric for rating the conditions of its pavements. It considers, roughness, cracking, rutting and faulting.

Secondary System (farm to markets) – roads that carry a medium to low volume of traffic in rural areas.

SOT - Secretary of Transportation

Stakeholder – SC General Assembly, citizens, MPO's, COG's, CTC's, FHWA

TAMP - Transportation Asset Management Plan. An agency level plan developed to strategically improve the condition of transportation assets by setting fiscally constrained performance targets.